

NOTE: A fish disease specialist should be consulted for
diagnostic assistance whenever a disease is suspected
and before chemical treatments are used.

The use of chemicals or drugs on fishes intended for
human or animal consumption must be in accordance
with current laws and regulations.

Use of trade names does not imply U.S. Government
endorsement of commercial products.

Some Fish Hosts of Viral Hemorrhagic Septicemia.

Atlantic salmon	<i>Salmo salar</i>
Brook trout	<i>Salvelinus fontinalis</i>
Brown trout	<i>Salmo trutta</i>
Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Coho salmon	<i>Oncorhynchus kisutch</i>
Gibel	<i>Carassius auratus gibelio</i>
Golden trout	<i>Oncorhynchus aguabonita</i>
Grayling	<i>Thymallus thymallus</i>
Lake trout	<i>Salvelinus namaycush</i>
Northern pike	<i>Esox lucius</i>
Pollan	<i>Coregonus lavaretus</i>
Sea bass	<i>Dicentrarchus labrax</i>
Steelhead or sea-run rainbow trout	<i>Oncorhynchus mykiss</i>
Turbot	<i>Scophthalmus maximus</i>
Whitefish	<i>Coregonus</i> sp.

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FISH HEALTH BULLETIN 9

VIRAL HEMORRHAGIC SEPTICEMIA OF FISHES

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INTRODUCTION

Viral hemorrhagic septicemia, or VHS, is a viral disease of trout, salmon, and several nonsalmonid fishes. The disease formerly was known by other names such as infectious kidney swelling and liver degeneration, trout plague, and Egrved disease (after a small village in Denmark where there was an outbreak of the disease). The disease occurs in susceptible fishes of any age and is known to cause significant losses in fish populations. Survivors of the infection usually become carriers of the virus. Until recently, when it was detected in the State of Washington (United States), VHS virus was confined to European and Scandinavian countries.

DIAGNOSIS AND IDENTIFICATION

Clinical signs of the disease vary with the severity of the infection. In acute infections, deaths are rapid and numerous. Fishes are sluggish, appear dark in color, have protruding eyeballs, and are anemic. Externally, hemorrhaging occurs in the eyes, skin, and gills, and at the base of the fins. Pinpoint hemorrhages appear internally in tissues around the eyes, in skeletal muscles, and in body organs. The liver is enlarged and discolored, and the kidneys are red and thin.

In chronic infections, deaths are numerous but they occur over a greater period. External signs of the chronic disease are similar to the acute stage, but hemorrhaging is not as extensive. The abdomen is swollen from accumulation of fluid in the liver, kidneys, and spleen. Internally, the liver is pale and the kidneys are gray.

In latent infections, most fishes appear normal and few die. However, some fishes may show signs of hyperactivity such as whirling, swimming erratically, or nervousness. Virus carriers show no signs of the infection.

Confirmed diagnosis can be made only by isolating and identifying the virus in the laboratory.

CAUSE OF THE DISEASE

The VHS virus, a member of the rhabdovirus group, is typically bullet-shaped. There are three distinct serological types of VHS virus. The virus is moderately stable in cell culture medium and can be preserved for years by freezing at 4°F (-20°C). The virus is inactivated by ether, chloroform, glycerol, formalin, sodium hypochlorite, iodophors, ultraviolet light, and by heating at 133–140°F (56–60°C). It is stable at pH 5.0–10.4 but inactivated at pH 3.5.

DTIC QUALITY INSPECTED 3

SOURCE OF INFECTION

Viral hemorrhagic septicemia infection can occur in susceptible fishes of all ages. Surviving fishes become virus carriers and shed the virus with urine and sex products. However, transmission of virus from adults to offspring through sex products has not been proven.

TRANSMISSION

The virus can be transmitted by infected fishes and through the water supply. Humans, rodents, herons, and probably other fish-eating birds, can mechanically transmit the virus. The virus is not known to be transmitted by parasites or insects. Transmission can occur in a hatchery by exposure of fishes to contaminated nets, pails, and other equipment.

Experimentally, the virus can be transmitted by injection, brushing the gills with the virus, and feeding fishes with food that contains the virus.

INCUBATION

The incubation period (from infection to the first signs of the disease) can be 7–15 days or up to a year or longer and depends on water temperature. Outbreaks usually occur in water temperatures below 59°F (15°C) and cease when the temperature rises. The greatest loss of infected fishes occurs at 37–41°F (3–5°C).

DETECTION

The most reliable technique for diagnosing VHS infection is laboratory isolation of the virus in cell cultures and serological virus identification. The virus can be isolated from fishes just before, during, and immediately after an active case of the disease, from ovarian fluid during spawning, and from organs and tissues of inapparent virus carriers. Infected fishes develop an immune response, but the presence of antibody is not an indicator of active infection.

SUSCEPTIBILITY OF FISH SPECIES

Viral hemorrhagic septicemia is primarily a disease of rainbow trout, but other species can be affected. Fingerlings 2–6 months of age are most severely affected, particularly during their first winter when water temperatures are colder than 59°F (15°C). Epizootics also have

occurred among brown trout and northern pike. Other species known to be naturally infected include grayling, whitefish, pollan, lake trout, chinook and coho salmon, and steelhead trout.

Experimentally, Atlantic salmon, brook trout, golden trout, gibel, sea bass, and turbot are susceptible to VHS virus infection; common carp, chub, Eurasian perch, roach, and tench are not.

GEOGRAPHIC DISTRIBUTION

Viral hemorrhagic septicemia is known to occur in Denmark, Germany, France, Italy, Switzerland, and Scandinavia. In 1989, VHS was isolated from wild returning chinook and coho salmon in the State of Washington (United States). The virus has not been detected in the British Isles, Canada, Mexico, South America, or the Far East.

DISEASE OCCURRENCE

Viral hemorrhagic septicemia occurs in winter and spring when water temperatures fall below 59°F (15°C). At coldwater hatcheries, the disease can be a problem the entire year. Viral hemorrhagic septicemia is rarely lethal in water with a temperature above 59°F (15°C). In a hatchery, stressful conditions such as handling, overcrowding, and poor nutrition increase the probability of disease. With good fish cultural management practices, few fishes develop the disease unless stress occurs.

CONTROL METHODS

As with other viral diseases, drugs or vaccines are not available for control of the VHS virus. The only control is preventing contact of fishes with the virus. Disinfection of facilities followed by restocking with VHS virus-free fishes and eggs is a successful method of control in hatcheries. The water supply to a culture station should be virus-free or treated with ultraviolet light. Stressful conditions should be eliminated. Presently several vaccines are being developed.

SUGGESTED READING

McAllister, P. E. 1990. Viral hemorrhagic septicemia of fishes. U.S. Fish and Wildlife Service, Fish Disease Leaflet 83. 5 pp.